World Academy of Science, Engineering and Technology
International Journal of Mechanical and Mechatronics Engineering
Vol:12, No:07, 2018

Effects of Injection Conditions on Flame Structures in Gas-Centered Swirl Coaxial Injector

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Abstract : The objective of this paper is to observe the effects of injection conditions on flame structures in gas-centered swirl coaxial injector. Gaseous oxygen and liquid kerosene were used as propellants. For different injection conditions, two types of injector, which only differ in the diameter of the tangential inlet, were used in this study. In addition, oxidizer injection pressure was varied to control the combustion chamber pressure in different types of injector. In order to analyze the combustion instability intensity, the dynamic pressure was measured in both the combustion chamber and propellants lines. With the increase in differential pressure between the propellant injection pressure and the combustion chamber pressure, the combustion instability intensity increased. In addition, the flame structure was recorded using a high-speed camera to detect CH* chemiluminescence intensity. With the change in the injection conditions in the gas-centered swirl coaxial injector, the flame structure changed.

Keywords : liquid rocket engine, flame structure, combustion instability, dynamic pressure
Conference Title : ICEHTFMT 2018 : International Conference on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics
Conference Location : Prague, Czechia
Conference Dates : July 09-10, 2018

Open Science Index, Mechanical and Mechatronics Engineering Vol:12, No:07, 2018 publications.waset.org/abstracts/90887/pdf